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ECONOMIES OF SCALE IN THE GAMING INDUSTRY: AN ANALYSIS OF CASINO OPERATIONS ON THE LAS VEGAS STRIP AND IN ATLANTIC CITY

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ABSTRACT

This study investigates economies of scale in the gaming industry. Vertical analyses of aggregate income statements were performed comparing large casinos with small casinos on the Las Vegas Strip and in Atlantic City. In addition, correlations between cost ratios and casino revenue of Atlantic City casinos were examined. The findings show that large casinos enjoy economies of scale in terms of cost of sales, payroll, and general and administrative (including marketing) expenses. The study suggests that consolidation via mergers and acquisitions to achieve economies of scale is a viable strategy for casinos to remain profitable in saturated gaming markets.

Introduction

As reported by Ryan (2001), in 2000, while Nevada casinos raked in more gaming wins, their profits fell to the lowest level in at least 16 years. A big reason for Nevada's declining casino profits was the performance of Las Vegas Strip casinos, where profits, measured as income before taxes and extraordinary items, dropped from $538 million in 1999 to $185 million in 2000. In particular, poor results of small casinos hurt the overall performance of the Strip. According to the Nevada Gaming Control Board (2000), 15 "small" casinos on the Strip (those with gaming revenues ranging from $1 million to $72 million) had a combined loss of $129 million, in comparison with an aggregate before-tax income of $314 million for 22 "large" casinos (those with gaming revenues of $72 million or more).

The declining profits of casinos in Nevada reflect the tough market conditions facing the U.S. gaming industry in recent years. Gu (1997) has cautioned that relentless casino expansions on the Las Vegas Strip could cause overcapacity. Berns (1998) has warned that the U.S. gaming market is becoming overbuilt and saturated. According to Ader, Falcone, and Steinberg (1999), there are serious concerns that U.S. gaming markets are either saturated or fast approaching saturation. In particular, both Nevada and New Jersey operators continue to face significant competition and challenging business conditions. In Las Vegas, continuous expansions and overcapacity have resulted in a highly competitive environment with increased pressure on gaming revenue and profit margins.

The pressure from intensified market competition is even more severe for small casinos. When the Bellagio, a hotel-casino with 3,005 rooms on the Strip, opened in late 1998, gaming analysts predicted that some second-tier Las Vegas resorts would close within 18 months (Wilen, 1998). In fact, with new mega casino resorts opening to the public one after another, the number of small casinos on the Strip has been declining since 1990.

Many of them went out of business or were acquired by large casinos. According to the Nevada Gaming Control Board (1990 & 2000), in 1990, there were 28 small casinos with gaming revenues below $72 million and 13 large casinos with gaming revenues of $72 million or more. By 2000, the number of small casinos had declined to 15, whereas the number of large casinos had increased to 22.

The changing numbers of Las Vegas Strip casinos reflect large casinos' better ability to survive and grow in tough markets. Large casinos have competitive advantages in challenging business environments. One of the advantages is low cost due to economies of scale. Commenting on the competitive advantages of large casinos, Ader et al. (1999) contend that large casinos are more efficient in lowering general and administration expenses, including marketing, and enjoy purchasing economies of scale. Mr. Arthur Goldberg, former CEO of Park Place Entertainment Corporation, one of the largest casino companies in the United States, was hailed as the promoter of the idea of economies of scale in the gaming industry. He helped his company win its dominance in America's three most lucrative venues—Las Vegas, Atlantic City, and Mississippi barges—by fostering economies of scale (Tully, 2000).

The purpose of this study is to verify that economies of scale exist in casino operations and to identify the areas in which large casino operations may exhibit economies of scale. To accomplish the research goal, this study examines the aggregate performance of large casinos versus small casinos on the Las Vegas Strip and in Atlantic City. Further, the study analyzes the correlations between cost ratios and scale of operation using the data of individual Atlantic City casinos. Nevada and Atlantic City are the two oldest and largest gaming jurisdictions in the United States. According to Simpson (2001), the combined gaming revenue of Nevada and Atlantic City reached $14.2 billion in 2000, representing 37% of total U.S. gaming revenue. The Strip generated half of Nevada's gaming revenue. For researchers interested in economies of scale in the service industries, findings from this study should contribute to the body of knowledge by providing evidence from casino operations in the two major U.S. gaming markets. For gaming practitioners, conclusions drawn from this study may carry strategic implications regarding how to survive and grow in gaming markets that have reached or are fast approaching saturation.

Economies of Scale

Van Horne (2001) defines economies of scale as the decline of average cost with increases in volume. Via large activity volume, cost savings can be achieved not only in production but also in marketing, purchasing, distribution, accounting and even finance. Economies of scale are not limited to the production of tangible goods. The production of intangible services can also demonstrate economies of scale. As Besanko, Dranove, and Shanley (2000) point out, the production process for a specific good or service exhibits economies of scale over a range of output when average cost declines over that range. Dunning (1989) suggests that multinational service firms, like manufacturing firms can benefit from global economies of scale in personnel specialization, financial management, and common governance. Campbell and Verbeke (1994) propose that service firms could achieve global economies of scale in marketing or image building.

Cullen (1997) examines economies of scale in hotel operations and proposes areas in which economies of scale may be possible. According to Cullen, economies of scale in hotel operations can be achieved in purchasing and production, management, personnel, marketing, and finance. A large hotel company can achieve lower purchasing cost if production is standardized so that large quantities are bought. There can be significant economies in training and deployment of managers and other highly skilled personnel. Standardization of training can reduce the cost of training. A large hotel chain's national marketing should be cheaper per hotel, since market research and promotion can cover more than one hotel at a time without a significant increase in cost. Cross-marketing should further lower the cost of marketing. Financially, a large hotel company can raise capital more easily at lower cost because of its size. In debt financing, large hotels may enjoy lower interest rates due to lower risk associated with large operations.

Cullen's (1997) propositions may apply to casinos as well. Casinos on the Strip and in Atlantic City are hotel-casinos typically comprising multiple revenue centers including gaming, rooms, and food and beverage departments. They have large teams of managers and skilled employees. Frequent and large-quantity purchasing of inventory is needed for their 24-hour food and beverage operations. Heavy marketing and promotion are commonplace in casino operations because of the competition for players. Finally, casinos have to update their gaming devices and properties to stay competitive, thus requiring a large amount of new capital investment. Christiansen (2001) suggests that steep economies of scale exist when there are high fixed costs versus variable costs in the predominant business model. Large organizations can depreciate and amortize fixed costs over greater volumes. With heavy investment in hotel rooms and gaming devices, casinos are typically fixed asset-intensive and are thus associated with significant depreciation and amortization cost. Depreciation and amortization may be another area that may demonstrate economies of scale in casino operations. Empirically, Lin and Liu (2000) examined the relationship between costs and operating scale, measured by total revenue, of Taiwan international tourist hotels. Their results show that there exist economies of scale in hotel operations.

Based on the propositions of Cullen (1997) and Christiansen (2001), this study examines economies of scale in casino operations. In particular, the study focuses on cost of sales, payroll, marketing and promotion, general and administration, interest, and depreciation and amortization. This study attempts not only to verify the existence of economies of scale in casino operations but also to identify the cost areas that demonstrate economies of scale.

Data and Methodology

Financial information of individual casinos on the Las Vegas Strip was not publicly available. Therefore, for the analysis of those casinos, this study used information from aggregate income statements of Strip casinos in the *Nevada Gaming Abstract (2000)* published by Nevada Gaming Control Board (2000). Based on gaming revenue, the Nevada Gaming Control Board (2000) classifies casinos on the Strip into two categories: small casinos, which are defined as those with gaming revenues ranging from $1 million

to $72 million (not including $72 million), and large casinos, which are defined as those with gaming revenues of $72 million or more. In 2000, there were 15 small casinos and 22 large casinos on the Strip. Vertical income statement analysis was conducted to compare the operations of the two groups and identify differences in their cost-to-revenue ratios. In a vertical analysis, all items of an income statement are expressed as percentages of total sales revenue. The resultant statement is referred to as a common-size income statement. According to Schmidgall (1997), vertical analysis allows more meaningful comparisons among hospitality operations in the same industry segment but with substantially different sizes. The *Nevada Gaming Abstract (2000)* contains statements of revenue centers. Therefore, vertical analysis was also performed for revenue center comparisons. Here, each item of a revenue center statement was presented as a percentage of the total department revenue.

For Atlantic City, this study used the information of individual income statements of Atlantic City casinos in 2000 provided by the State of New Jersey Casino Control Commission (2000). Unlike the Nevada Gaming Control Board, the New Jersey Casino Control Commission does not publish aggregate income statements of casinos. In 2000, the gaming revenues of the 12 casinos in Atlantic City ranged from $164 million to $538 million. To conduct a comparative analysis between large and small casinos similar to that for the Las Vegas Strip, seven casinos with gaming revenues below $400 million were grouped as "small" casinos and five casinos with gaming revenues of $400 million or higher were assigned to a "large" group. The individual income statements of the casinos in each group were aggregated and vertical analysis was conducted to compare the two groups' performance with an emphasis on their cost-to-revenue ratios.

The $400 million benchmark for separating "large" from "small" casinos in the Atlantic City was somewhat arbitrary. Therefore, the results of the vertical analysis were further confirmed by an examination of the correlation coefficients between scale of operation and cost-to-revenue ratios. The cost ratios were computed for each casino, and the correlations between total sales revenue (a measure of operation scale) and the ratios were examined. Based on the data of 12 casinos, it would be hard to determine whether the correlations between scale of operation and cost-to-revenue ratios were linear or nonlinear. Therefore, both Pearson's correlation coefficient and Kendall's tau-b were derived and tested. Pearson's correlation coefficient is a measure of linear association between two variables; Kendall's tau-b, a nonparametric measure of association for ordinal or ranked variables, is a suitable statistic for measuring nonlinear association (Norusis, 1999). The two correlation coefficients have their possible values between –1 and +1. For both correlation measures, a significant and negative correlation coefficient between the total revenue and a cost ratio would suggest lower cost associated with large operation, thus proving the existence of economies of scale in that particular cost area.

Analysis of Casinos on the Las Vegas Strip

Tables 1 through 4 compare the operations of the four revenue centers—casino, rooms, food, and beverage departments—of small and large casinos on the Las Vegas Strip. Table 1 lists the operation results of the casino departments of the two groups. Evi-

dently, large casinos were more efficient in generating gaming revenue, achieving much higher gaming revenue per square foot and per employee. The casino departments of large casinos also had an advantage in their payroll and related expenses, which, at 18.5% of department revenue, were much lower than small casinos' 27.2%. Large casinos, however, incurred higher bad debt cost and promotion cost (denoted as "complimentary and preferred guest expenses") at 5.3% and 20.6% of department revenue respectively, versus 0.5% and 16.9% for small casinos. With their lower payroll and related expenses offset by higher bad debt and promotion expenses, large casinos' total departmental expenses were 62.6% of department revenue, still lower than small casinos' 63.7%. Unlike small casinos that typically impose low betting limits, large casinos on the Strip are commonly engaged in high-roller operations. While their higher bad debt reflects higher risk associated with high-roller operations, their higher complimentary and preferred guest expenses indicate large casinos' aggressive promotion toward players, high rollers in particular. Large casinos' higher ratios in the two cost items reflect their particular operational feature, rather than diseconomies of scale.

Table 1
Casino department performance (Las Vegas Strip casinos)

	Small Casinos	**Large Casinos**
Gaming Revenue per Square Foot	$898	$1,942
Gaming Revenue per Employee	$112,726	$195,518
Department Revenue	100%	100%
Bad Debt	0.5	5.3
Complimentary and Preferred Guest Expenses	16.9	20.6
Gaming Taxes and Licenses	8.1	7.2
Payroll and Related Expenses	27.2	18.5
Other Departmental Expenses	11.0	11.0
Total Departmental Expenses	63.7	62.6
Departmental Income	36.3	37.4

Note: Items starting from "Department Revenue" are expressed as percentages of total department revenue.

Table 2 compares the performance of the rooms departments of the large and small casinos on the Strip. Large casinos achieved better revenue per room and revenue per employee. Large casinos had an obvious cost advantage in payroll and related expenses at 23.2% of department revenue, in contrast with small casinos' 32.2%. Large casinos' lower payroll and related expenses resulted in their higher department income, 65.3% of department revenue, about 10 percentage points better than small casinos' 55.7%.

Table 2
Rooms department performance (Las Vegas Strip casinos)

	Small Casinos	Large Casinos
Revenue per Available Room	$58.79	$94.40
Revenue per Employee	$85,954	$128,133
Department Revenue	100%	100%
Payroll and Related Expenses	32.2	23.2
Other Departmental Expenses	12.1	11.5
Total Departmental Expenses	44.3	34.7
Departmental Income	55.7	65.3

Note: Items starting from "Department Revenue" are expressed as percentages of total department revenue.

Table 3 demonstrates the performance of the food departments of the two groups. Large casinos' food revenue per employee, $57,626, was more than double the small casinos' $24,437. Large casinos enjoyed their cost advantage mainly in two areas: cost of sales (at 32% of food revenue) and payroll and related expenses (at 57.7% of food revenue). These figures contrast with small casinos' 40.1% and 67.8%, respectively. The two costs were so high for small casinos that their food departments suffered a loss of 13.6% of department revenue.

Table 3
Food department performance (Las Vegas Strip casinos)

	Small Casinos	Large Casinos
Food Revenue per Employee	$24,437	$57,626
Department Revenue	100%	100%
Cost of Sales	40.1	32.0
Payroll and Related Expenses	67.8	57.7
Other Expenses	5.7	7.9
Total Departmental Expenses	113.6	97.6
Departmental Income	-13.6	2.4

Note: Items starting from "Department Revenue" are expressed as percentages of total department revenue.

Table 4 compares the beverage departments of the two groups. Large casinos' beverage revenue per employee, $82,690, was slightly higher than their small competitors'

$79,212. Their payroll and related expenses, 32.5% of beverage revenue, were marginally lower than the 33.9% for small casinos. Large casinos' major cost advantage was in cost of sales, 22.5% of beverage revenue versus small casinos' 28%.

Table 4
Beverage department performance (Las Vegas Strip casinos)

	Small Casinos	**Large Casinos**
Beverage Revenue per Employee	$79,212	$82,690
Department Revenue	100%	100%
Cost of Sales	28.0	22.5
Payroll and Related Expenses	33.9	32.5
Other Expenses	5.0	4.1
Total Departmental Expenses	66.9	59.1
Departmental Income	33.1	40.9

Note: Items starting from "Department Revenue" are expressed as percentages of total department revenue.

The above analysis of the four revenue centers of Strip casinos shows that large casinos were more efficient in revenue generation, achieving higher revenues per employee, per square foot, and per available room. Evidently, large casinos' higher labor efficiency has contributed to their lower labor cost as evidenced by their lower payroll and related expenses ratios in all four departments. Large casinos' advantage in purchasing, as demonstrated by their lower cost of sales to revenue ratios, is also obvious.

Table 5 is a vertical analysis of the overall income statements of small and large casinos on the Strip. Here, each item is presented as a percentage of the total casino revenue. Among the three costs incurred in revenue centers—cost of sales, operated department payroll and related expenses, and other operated departmental expenses—large casinos outperformed small casinos in the first two, being two percentage points lower in cost of sales and 6.5 percentage points lower in payroll and related expenses. Large casinos, however, had higher other operated departmental expenses, 27.3% versus small casinos' 22.1%. The substantially higher bad debt and complimentary and preferred-guest expenses of large casinos (see Table 1) should have contributed to this higher cost ratio, since the casino department is the largest revenue center of a casino-hotel on the Strip. Nonetheless, large casinos' lower cost of sales and operated department payroll and related expenses offset their higher other operated departmental expenses, leading to their higher departmental income, at 40.5% of total revenue, compared with the 37.2% of small casinos.

Table 5
Vertical analysis of Las Vegas Strip casino aggregate income statement

	Small Casinos	Large Casinos
Total Revenue	100%	100%
Cost of Sales	8.7	6.7
Operated Department Payroll and Related Expenses	32.0	25.5
Other Operated Departmental Expenses	22.1	27.3
Total Departmental Income	37.2	40.5
Advertising	2.9	2.7
Payroll & Related Expenses	7.9	6.9
Depreciation and Amortization	9.4	8.1
Rent of Premises	3.9	0.6
Interest Expenses	8.6	7.0
Other General and Administrative Expenses	19.7	11.8
Total General and Administrative Expenses	52.4	37.1
Income before Taxes & Extraordinary Items	-15.2	3.4

In Table 5, cost items from advertising to other general and administrative expenses are non-revenue center costs categorized as "General and Administrative Expenses" by the *Nevada Gaming Abstract (2000)*. In this category, large casinos had lower ratios for all cost items. While large casinos' advertising expense was lower by a small margin of two-tenths of a percentage point, their payroll and related expenses, depreciation and amortization, rent of premises, and interests were all lower than the small casinos' counterparts by at least one percentage point. In particular, the other general and administrative expenses, which included energy, utilities, equipment rental, and music and entertainment, etc., accounted for 11.8% of large casinos' total revenue, much lower than small casinos' 19.7%. The total general and administrative expenses of large casinos, at 37.1% of total revenue, were about 15 points lower than small casinos' 52.4%.

It should be pointed out that the lower interest expense of large casinos, 7% of total revenue compared with small casinos' 8.6%, could be due to large casinos' lower debt use. According to the *Nevada Gaming Abstract (2000)*, the large casinos' debt ratio, or total liabilities to total assets, was 0.54 in 2000, much lower than the small casinos' 0.77. Therefore, the lower interest expense of large casinos does not necessarily imply economies of scale in finance.

As shown in Table 5, large casinos' lower cost of sales and operated department payroll and related expenses ratios were obviously the main reasons for their higher departmental income. Large casinos' much lower general and administrative expenses further enlarged the performance gap between the two groups, leaving large casinos with

income before taxes and extraordinary items at 3.4% of total revenue. In contrast, higher expenses of small casinos, especially in the category of general and administrative expenses, led to their loss of 15.2% of total revenue, even before taxes and extraordinary items.

The sizable performance gap between large and small casinos provides evidence of the overall cost advantage of large casinos on the Strip. The itemized comparative analysis of cost ratios further indicates that large casinos enjoy economies of scale notably in the areas of cost of sales, payroll, general and administration (including marketing), depreciation and amortization, and rent. Large casinos, however, outspent small casinos in bad debt and promotion.

Evidence from Atlantic City Casinos

The revenue of each of the12 Atlantic City casinos far exceeded $72 million in 2000. None of those casinos could be classified as "small" by the $72 million benchmark of the Las Vegas Strip. To compare the performance of relatively small casinos with their large competitors in Atlantic City, seven casinos with gaming revenues below $400 million were singled out to compose a "small" group and five casinos with gaming revenues greater than $400 million were assigned to the "large" group. The "small" group had its mean gaming revenue at $268.2 million with a range of $163.9 million to $342.9 million; the "large" group's gaming revenues averaged $469.2 million, ranging from $400.4 million to $538.3 million.

Department statements of Atlantic City casinos were not available. Therefore, comparison of each revenue center for the two groups was impossible. Table 6 is a vertical analysis of the aggregate income statements of the two groups. Each cost item is expressed as a percentage of total revenue. The income statements of casinos published by the State of New Jersey Casino Control Commission (2000) were different from the aggregate income statements of the Las Vegas Strip in format and less detailed. For example, cost of sales and labor cost were combined as "cost of goods and services."

Table 6 is a comparison of the aggregate income statements of large and small casinos in Atlantic City. Promotional allowances were the same for the two groups and doubtful accounts differed slightly. Large differences, however, existed in two major costs: cost of goods and services and selling, general, and administrative. In 2000, large casinos had the two costs at 44.1% and 18.8% of total revenue, comparing favorably with small casinos' 49.3% and 23.8%. Large casinos' lower cost of goods and services, which included cost of sales and payroll, are suggestive of their economies of scale in purchasing and labor. Large casinos' lower selling, general, and administrative cost (which contained marketing expense) may be evidence of economies of scale in marketing and general and administration. Large casinos also performed better in other operating costs and other non-operating expenses.

Table 6
Vertical analysis of Atlantic City casinos' aggregated income statements

	Small Casinos	Large Casinos
Total Revenue	100%	100%
Promotional Allowances	10.9	10.9
Net Revenue	89.1	89.1
Cost of Goods and Services	49.3	44.1
Selling, General, and Administrative	23.8	18.8
Provision for Doubtful Accounts	0.7	0.6
Gross Operating Income	15.3	25.6
Depreciation & Amortization	4.8	5.4
Management Fees	0.9	2.4
Other Operating Costs	2.0	1.3
Income from Operations	7.6	16.4
Interest Expense	9.1	9.5
Other Non-operating Expenses	1.0	0
Income Before Taxes & Extraordinary Items	-2.5	7.0

Note: Large casinos include Bally's Park Place, Caesars, Harrah's, Tropicana, and Trump Taj Mahal with gaming revenues ranging from $400 million to $538 million. Small casinos are Hilton, Claridge, Resorts, Sands, Showboat, Trump Marina, and Trump Plaza with gaming revenues between $164 million and $342 million.

Nevertheless, large casinos had higher cost percentages in three areas that were beyond management control: depreciation and amortization, management fees, and interest expense. Large casinos' higher ratios of these costs, however, do not necessarily mean diseconomies of scale. Among the five large casinos, Caesars, Harrah's, and Tropicana were expanded in 1996 and 1997, while Trump Taj Mahal, completed in 1990, was the youngest casino in Atlantic City. In contrast, among the seven relatively small casinos, only Hilton underwent expansion in 1998. The rest were built between 1978 and 1985. The higher depreciation and amortization of large casinos may well be due to their relatively newer properties. As shown in Table 6, large casinos achieved better gross operating income (25.6% of total revenue) than small casinos (15.3%) in 2000. Therefore, their performance-based management fees were justifiably higher. The slightly higher interest expense ratio of large casinos could be due to a more debt-oriented capital structure, for which the information was not available, rather than diseconomies in financing.

Table 7 presents the correlation coefficients between cost-to-revenue ratios and total revenue of the 12 casinos and the statistical significance levels associated with the coefficients. The correlation coefficients between incomes and total revenue are also shown.

The P values (in parentheses) indicate the significance levels for rejecting the null hypothesis that the coefficients are not different from zero.

Table 7
Correlation coefficients between revenue and cost/income percentages

	Pearson	**Kendall's tau-b**
Promotional Allowances	0.097 (0.382)	0.147 (0.324)
Cost of Goods and Services	-0.721 (0.004)***	-0.846 (0.000) ***
Selling, General, and Administrative	-0.684 (0.007)***	-0.783 (0.001)***
Provision for Doubtful Accounts	0.052 (0.437)	-0.021 (0.474)
Gross Operating Income	0.792 (0.001)***	0.818 (0.001)***
Depreciation & Amortization	0.560 (0.029)**	0.378 (0.113)
Management Fees	0.381 (0.111)	0.284 (0.186)
Other Operating Costs	0.037 (0.455)	-0.036 (0.455)
Income From Operations	0.716 (0.005)***	0.671 (0.008)***
Interests	0.363 (0.123)	0.434 (0.080)*
Other Non-Operating Expenses	-0.553 (0.031)**	-0.427 (0.083)*
Income Before Taxes & Extraordinary Items	0.509 (0.045)**	0.387 (0.103)*

Note: 1 Cost and income items are measured as percentages of total casino revenue.
2. The numbers in parentheses are P values that indicate the significance levels at which the coefficients are different from zero.
3. *** significant at the 0.01 level, ** significant at the 0.05 level, and * significant at the 0.1 level.

In Table 7, in terms of both Pearson correlation coefficients and Kendall's tau-b, cost of goods and services and selling, general, and administrative are negatively correlated with total revenue at the 0.01 significance level, indicating strong negative association between operation scale and the two cost items. For depreciation and amortization, while the significant Pearson correlation coefficient suggests that the cost is positively correlated with total revenue, the insignificant Kendall's tau-b does not support such a correlation. The Kendall's tau-b of interest indicates a positive correlation with total revenue at the 0.1 significance level, whereas the Pearson correlation between interest and total revenue is not significant. For the relationship between other non-operating expenses and total revenue, both coefficients indicate significant negative association at least at the 0.1 level. The ratios of three incomes—gross operating income, income from operation, and income before taxes and extraordinary items—are all positively correlated with total revenue at least at the 0.1 level. No significant correlations are found between total revenue and promotional allowances, provision for doubtful accounts, management fees, and other operating costs.

The correlation coefficient analysis, supported by statistical testing, should bear greater credibility than the vertical analysis of the aggregate income statements of large

and small casinos of Atlantic City grouped by an arbitrary criterion of $400 million gaming revenue. The highly significant negative correlations between total revenue and the ratios of cost of goods and services, selling, general, and administrative, and other nonoperating expenses, confirm the cost advantages large casinos enjoy in those areas identified in the vertical analysis of income statements. In particular, the negative associations are strong evidence of economies of scale in terms of cost of sales, payroll, and general and administration including marketing. The better performance of large casinos, manifested in their higher ratios of gross operating income, income from operation, and income before taxes and extraordinary items in the vertical analysis of aggregate income statements, is also confirmed by the positive and significant correlation coefficients between the three incomes and total revenue. The relationships between scale of operation and depreciation and amortization and interest, however, were inconclusive. Finally, the correlation coefficients provide no evidence that Atlantic City casinos enjoyed economies of scale in promotional allowances, provision for doubtful accounts, management fees, and other operating costs.

Summary and Conclusions

To examine economies of scale in the gaming industry, this study conducted vertical analyses of income statements for large and small casinos on the Las Vegas Strip and in Atlantic City. The correlation coefficients between scale of operation and cost ratios for Atlantic City casinos were also examined. Based on the findings of the study, it can be concluded that there exist economies of scale in casino operations. Specifically, large casinos exhibit economies of scale in the areas of cost of sales, payroll, and general and administration, including marketing. On the other hand, large casinos' advantages in debt financing and depreciation and amortization are inconclusive and deserve further investigation.

The overall cost advantage of large casinos has contributed substantially to their better profitability. While large casinos were profitable, small casinos in both Las Vegas and Atlantic City markets were operating with losses in 2000. In particular, the loss suffered by small casinos on the Las Vegas Strip was sizable. The findings of this study suggest that large casinos are more cost efficient and hence more profitable. They are advantageously positioned in gaming markets that are experiencing fierce competition. For casino operators, an important implication of the findings is that increasing the scale of operation may be the key to survival and success in gaming markets that are saturated or approaching saturation.

One way to increase casino operation scale is to expand the existing facility by adding more hotel rooms and gaming devices. Some casinos appear to be pursuing such a strategy. For example, according to the Las Vegas Convention and Visitors Authority (2001), the Venetian, a 3,000-room hotel-casino on the Las Vegas Strip that opened in 1999, will add 1,100 rooms in 2002. A follow-up expansion, with undetermined completion date, will add another 3,000 rooms. After its two-phase expansion, the 7,100-room Venetian will be the largest hotel-casino on the Strip.

Increasing operation scale via expansion, however, may not be the best solution for casinos in saturated gaming markets. Expansions can further increase the pressure of saturation on existing casinos, including those engaged in expansions. A better strategy to achieve economies of scale may be consolidation via mergers and acquisitions. Gaughan (1991) argues that one of the main sources of operating synergies achieved in mergers and acquisition is the cost reduction resulting from economies of scale due to the increase in the size or scale of a company's operations. The successful merger in 2000 of MGM Grand and Mirage Resorts, two former casino giants on the Strip, is an example of the strategy. Strow (2001) reports that after the merger, the performance of the Bellagio, the newest and largest property of former Mirage Resorts, was much better in 2000 than in 1999. The improvement was due to significant cost-containment measures implemented mostly in the back of the house: 5% reduction in payroll, savings in purchasing, consolidation of customer systems into a central location, and combined marketing with MGM Grand following the merger.

Market saturation on the Strip and in Atlantic City is not expected to ease in the near future. Both markets will remain highly competitive. Economists expect more gaming mergers but fewer new resorts in the Las Vegas gaming industry (Leong, 2001). The same trend could be expected for Atlantic City because of its similar market conditions. As reported by Curran (2001), analysts are concerned that in Atlantic City the impending entry of the Borgata—a 2,010-room mega-casino now under construction—and a companion marina district casino planned by MGM Mirage will mean trouble for existing casinos, some of which are already fighting for their lives. Atlantic City casinos are expected to compete very aggressively for each other's customers when the Borgata opens.

In highly competitive gaming markets, increasing operation scale can help casinos remain profitable thanks to economies of scale. Consolidation via mergers and acquisitions may enable casino operations achieve economies of scale without increasing market saturation. For casino operators, particularly those facing cutthroat competition in saturated markets, consolidation via mergers and acquisitions should be a viable strategy for survival and growth.

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